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—2— New Patent Application  
Docket No. 32860-000662/US

~~Patent Claims~~ What is claimed is:

1. A combined emission tomography and computer tomography unit (ET/CT unit) for imaging an object to be examined, having comprising:
  - 1.1. a scintillation detector (7) and an evaluation unit (8) for recording radiation emitted from the object (P) to be examined;  
and
  - 1.2. a computer tomography unit (CT) with including at least one radiation source (1) rotating about a system axis (12), from which there emanates a fan-shaped radiation beam emanates (3) that scans a measuring field (5) and supplies, together with a detector system (2) output signals from which the distribution of the attenuation coefficients of the object (P) to be examined can be reconstructed reconstructable with reference to a reconstruction field (6); and
  - 1.3. means (Px) being provided that for correcting the detected data of the emission tomography unit (ET) by means of using the distribution, examined by the CT, of the attenuation coefficients in the object (P) to be examined, wherein characterized in that
  - 1.4. the reconstruction field (6) is larger than the measuring field (5).
2. The ET/CT unit as claimed in the preceding patent claim 1, characterized in that wherein the CT has includes means (Px) for extrapolating the measured data for the region of the reconstruction field (6) that is situated outside the measuring field (5) in order to extrapolate data of the reconstruction field (6) that are situated outside the measuring field (5).

Ur. Moritz  
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3. The ET/CT unit as claimed in ~~the preceding patent~~ claim 2, characterized in ~~that wherein~~ the CT ~~has~~ includes means (Px) ~~that for~~ obtaining the data for the region of the reconstruction field (6) that is situated outside the measuring field (5) by extrapolating cut projections.
4. The ET/CT unit as claimed in ~~one of the preceding patent claims 1 to 3~~, characterized in ~~that wherein~~ the CT includes ~~has~~ means (Px) ~~that for~~ detecting cut projections and extrapolating data, referring to the region of the reconstruction field (6) situated outside the measuring field (5) for detected cut projections.
5. The ET/CT unit as claimed in ~~one of the preceding patent claims 2 to 4~~, characterized in ~~that wherein~~ the CT includes ~~has~~ means (Px) ~~that for~~ subjecting the extrapolated data to smoothing for the purpose of artifact reduction.
6. The ET/CT unit as claimed in ~~one of the preceding patent claims 1 to 5~~, characterized in ~~that wherein~~ the measuring field (5) and the reconstruction field (6) have ~~include~~ a circular contour and are arranged concentrically with one another.
7. The ET/CT unit as claimed in ~~the preceding patent~~ claim 6, characterized in ~~that wherein~~ the radiation beam (3) of the CT emanates from a focus of the radiation source (1) that can be moved ~~is~~ moveable on a circular path about the system axis (12).
8. The ET/CT unit as claimed in ~~one of the preceding patent claims 1 to 7~~, characterized in ~~that wherein~~ the

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CT includes, has as a radiation source, an X-ray source  
+1) emitting X radiation.

9. The ET/CT unit as claimed in one of the preceding  
patent claims 1-to 8, characterized in thatwherein the  
measuring field of the CT +12) covers the circular  
region that is circumscribed by the outer rays of the  
radiation beam +3) of the CT, and the reconstruction  
field +6) together with the measuring field +5) also  
~~comprises~~ includes at least the region of the object  
(P) to be examined that goes beyond the measuring field  
+5), preferably a circular region that covers the  
entire object (P).

10. The ET/CT unit as claimed in one of the preceding  
patent claims 1-to 9, characterized in thatwherein the  
CT part ~~has~~ includes a dedicated radiation detector  
+2).

11. The ET/CT unit as claimed in one of the preceding  
patent claims 1-to 9, characterized in thatwherein the  
radiation detectors +7) of the CT and ET are identical.

12. The ET/CT unit as claimed in one of the preceding  
patent claims 1-to 11, characterized in thatwherein the  
ET part of the unit is a PET, and further comprising  
means +Px) ~~are present~~ for determining coincident  $\gamma$   
radiation that is generated by positron decay events.

13. The ET/CT unit as claimed in one of the preceding  
patent claims 1-to 11, characterized in thatwherein the  
ET part of the unit is a SPECT.

14. A method for producing ET images from an object to  
be examined with the aid of a combined ET and CT unit.

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~~preferably as claimed in one of claims 1 to 13,~~  
comprising:

~~correcting a measured ET image using account being~~  
~~taken, during production of the ET images of the~~  
~~spatial distribution, measured by the CT, of the~~  
~~attenuation coefficients in the a measuring field +5)~~  
~~of the CT in order to correct the measured ET image,~~  
~~wherein the — characterized in that attenuation~~  
~~coefficients of the object (P) to be examined, that are~~  
~~disposed outside the measuring field, — (5) — are~~  
~~determined are determined by extrapolation of detector~~  
~~channels and likewise used to correct the ET images.~~

15. The method as claimed in ~~the preceding method~~  
claim 14, ~~characterized in that~~wherein extrapolation of  
cut projections is used.

16. The method as claimed in ~~one of the preceding~~  
~~method claims 14 to 15,~~ characterized in ~~that~~wherein  
point reflection is used as an extrapolation method.

17. The method as claimed in ~~one of the preceding~~  
~~method claims 14 to 15,~~ characterized in ~~that~~wherein  
linear extrapolation is used as an extrapolation  
method.

18. The method as claimed in ~~one of the preceding~~  
~~method claims 14 to 17,~~ characterized in ~~that~~wherein at  
least the extrapolated data are subjected to smoothing  
for the purpose of artifact reduction.

19. The method as claimed in ~~one of the preceding~~  
~~method claims 14 to 18,~~ characterized in ~~that~~wherein  
different detectors ~~(2, 7)~~ are used to detect ET  
radiation and CT radiation.

20. The method as claimed in ~~one of the preceding method claims 14 to 18, characterized in that~~ wherein a common detector ~~(7)~~, preferably a scintillation detector, is used to detect ET radiation and CT radiation.

21. The method as claimed in ~~one of the preceding method claims 14 to 20, characterized in that~~ wherein the attenuation coefficients determined in the CT method are converted to the attenuation coefficients to be expected with reference to ET radiation.

22. The method as claimed in ~~one of the preceding method claims 14 to 21, characterized in that~~ wherein the PET method is used as ET method.

23. The method as claimed in ~~one of the preceding method claims 14 to 21, characterized in that~~ wherein the SPECT method is used as ET method.

24. The ET/CT unit as claimed in claim 2, wherein the CT includes means for detecting cut projections and extrapolating data, referring to the region of the reconstruction field situated outside the measuring field for detected cut projections.

25. The ET/CT unit as claimed in claim 1, wherein the measuring field of the CT covers the circular region that is circumscribed by the outer rays of the radiation beam of the CT, and the reconstruction field together with the measuring field also includes at least a circular region that covers the entire object.

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26. The method as claimed in claim 15, wherein at least the extrapolated data are subjected to smoothing for the purpose of artifact reduction.
  27. The method as claimed in claim 16, wherein at least the extrapolated data are subjected to smoothing for the purpose of artifact reduction.
  28. The method as claimed in claim 17, wherein at least the extrapolated data are subjected to smoothing for the purpose of artifact reduction.
  29. The method as claimed in claim 14, wherein a scintillation detector is used to detect ET radiation and CT radiation.